Claims 1-21 were originally presented. The limitations of claims 3, 10 and 17 have been amended into their respective parent claims. Thus, claims 3, 10 and 17 are cancelled and claims 1-2, 4-9, 11-16 and 18-21 are all the claims presently pending in the application. Claims 1-2, 4-9, 11-16 and 18-21 stand rejected for failing to particularly point out and distinctly claim the subject matter of the invention. Claims 1-2, 4-9, 11-16 and 18-20 further stand rejected as being directed towards non-statutory subject matter. Claims 1-2, 4-9, 11-16 and 18-21 further stand rejected on prior art grounds. Applicants respectfully traverse these rejections based on the following discussion. The following paragraphs are numbered for ease of future reference.

I.   The 35 U.S.C. §112, Second Paragraph, Rejection

Claims 1-2, 4-9, 11-16 and 18-21 stand rejected under 35 U.S.C. §112, second paragraph, for being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. These rejections are traversed as explained below.

In rejecting claims 1, 8, 15 and 21, the Office Action indicated that the word "independent" is misleading. It should be noted that the word independent was not used in claim 1, but rather in dependent claim 2. Claims 2, 8, 15 and 21 are amended, deleting reference to smaller "independent" linear programs and, thereby making the rejections moot.

In rejecting claim 7, the Office Action indicated that the word "relates" is vague and indefinite. Claim 7 is amended to clarify that the stocking point criteria are associated with time dependent stocking points comprising part numbers, locations of parts identified by the part

numbers, and the time periods when the parts will be available, thereby making the limitation definite. It should be noted that claim 15 is similarly amended.

In rejecting claims 8, 15 and 21, the Office Action indicates that "said material balance and sourcing constraints" lack antecedent basis. The claim limitation claiming this feature has been deleted, thereby making the rejection moot.

In rejecting claims 3, 10 and 17, the Office Action indicates that phrase "with the least complex parts" is vague and indefinite. This feature has been amended into the independent claims with further clarification that "said least complex parts comprise raw materials and unassembled parts", thereby making the limitation definite.

Finally, in rejecting claims 10, 11, 12, 17, 18 and 19, the Office Action indicates that the term "temporarily" renders the claims indefinite. The claims have been amended, deleting the term "temporarily", thereby making the rejection moot.

In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw this rejection.

II.   The 35 U.S.C. §101 Rejection

Claims 1-2, 4-9, 11-16 and 18-20 stand rejected under 35 U.S.C. §101 because the Office Action asserts that the claimed invention is directed to non-statutory subject matter. These rejections are traversed as explained below.

Regarding the rejection of method claims 1-2, 4-9, 11-16 and 18-20 under 35 U.S.C§101, the Federal Circuit Court of Appeals in *In re Bilski*, __ F.3d __ (Fed. Cir. 2008)(*en banc*) recently held that to be statutory a process must be either (1) tied to another statutory class (such

as a particular apparatus) or (2) transform underlying subject matter (such as an article or materials) to a different state or thing. As amended, independent claim 1, 8 and 15 includes method steps that are tied to a machine and, more particularly, a computer system. Therefore, the Applicants submit independent claims 1, 8 and 15 are directed to statutory subject matter under 35 U.S.C. §101 and, thus, dependent claims 2, 4-7, 9, 11-14, 16 and 18-20 are similarly directed to statutory subject matter under 35 U.S.C. §101.

In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw this rejection.

III.   The Prior Art Rejections

Claims 1-2, 4-9, 11-16 and 18-21 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Hedge et al. (U.S. Publication No. 2003/0065415), hereinafter referred to as Hedge. The Applicants respectfully traverse these rejections based on the following.

More particularly, the Applicants submit that Hedge should be disqualified as prior art against the claimed invention in any 35 U.S.C. §103(a) rejections pursuant to 35 U.S.C. §103(c), as discussed in MPEP§2146. Specifically, 35 U.S.C. §103(c), (1) provides that "Subject matter developed by another person, which qualifies as prior art only under one or more of subsections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the claimed invention was made, owned by the same person or subject to an obligation of assignment to the same person." The Applicants submit that Hedge only qualifies as prior art under subsection (e) of 35 U.S.C.

§102. Furthermore, the invention of Hedge and the present invention were, at the time the claimed invention was made, subject to an obligation of assignment to the same person, namely International Business Machines Corporation (IBM), Armonk, NY (e.g., as evidenced by ATTACHMENT A, a copy of the Notice Of Recordation Of Assignment of the present application to (IBM), and as further evidenced by ATTACHMENT B, a copy of the first page of the Hedge patent indicating assignment to IBM). Therefore, the Applicants respectfully request that Hedge be disqualified, under 35 U.S.C. §103(c), from being cited as prior art against the present application in any rejections under 35 U.S.C. §103(a).

Additionally, the Applicants submit that claims 1-2, 4-9, 11-16 and 18-21 were not actually rejected under 35 U.S. §103(a) as being unpatentable over Hedge alone, but rather over Hedge in view of Official Notice taken by Examiner, and that such Official Notice was not properly taken. Specifically, in rejecting independent claims 1, 8, 15 and 21, the Office Action acknowledges that Hedge does not disclose several of the claimed limitations. However, rather than citing additional prior art references in combination with Hedges in order to support claim rejections under 35 U.S.C. §103(a), the Examiner has taken "Official Notice" that these limitations are old and well-known in the art and further argues that two different published articles, by Dantzig and Karbuk, respectively, generally (i.e., without reference to the relevant column or page number(s) and line number(s)) provide evidence in support of the taking of Official Notice. The Applicants respectfully disagree and challenge the factual assertions made by the Examiner as not being properly officially noticed.

Per MPEP§2144.03, the notice of facts beyond the record which may be taken by the examiner must be "capable of such instant and unquestionable demonstration as to defy dispute".

In this case, the subject claim limitations are not capable of such instant and unquestionable demonstration as to defy dispute. Consequently, the Examiner cited the above-mentioned articles by Dantzig and Karbuk as documentary evidence in support of the taking of Official Notice. However, the Applicants submit that neither Dantzig, nor Karbuk, qualify as documentary evidence for the purpose of taking Official Notice. Specifically, MPEP§2144.03 provides as follows: "assertions of technical facts in the areas of esoteric technology or specific knowledge of the prior art must always be supported by citation to some reference work recognized as standard in the pertinent art", citing *In re Ahlert*, 424 F.2d at 1091, 165 USPQ at 420-21. See also *In re Grose*, 592 F.2d 1161, 1167-68, 201 USPQ 57, 63 (CCPA 1979). Dantzig and Karbuk are published articles: one written in 1960 and related to decomposition in linear programming; and, the other written in 2001 and related to capacity planning in the semiconductor industry. However, the Applicants submit that, while these articles may be related to the pertinent art, there has been no showing that they are "recognized as standard in the pertinent art". Since the Dantzig and Karbuk articles do not provide sufficient documentary evidence of what is standard in the pertinent, any factual assertions made by the Examiner based on information contained in these articles should not be officially noticed.

Additionally, MPEP§706.02(j) discusses 35 U.S.C. 103 rejections and provides that 35 U.S.C. §103 authorizes a rejection where, to meet the claim, it is necessary to modify a single reference or to combine it with one or more other references. MPEP§706.02(j) further provides that "Where a reference is relied on to support a rejection, whether or not in a minor capacity, that reference should be positively included in the statement of the rejection", citing *In re Hoch,* 428 F.2d 1341, 1342 n.3 166 USPQ 406, 407 n. 3 (CCPA 1970). MPEP§706.02(j) further

provides that the Office Action should set forth: "(A) the relevant teachings of the prior art relied upon, preferably with reference to the relevant column or page number(s) and line number(s) where appropriate, (B) the difference or differences in the claim over the applied reference(s), (C) the proposed modification of the applied reference(s) necessary to arrive at the claimed subject matter, and (D) an explanation >as to< why >the claimed invention would have been obvious to< one of ordinary skill in the art at the time the invention was made", as required by MPEP§706.02(j). Since the Dantzig and Karbuk articles do not provide adequate documentary support for the taking of Official Notice, since the Dantzig and Karbuk articles are not positively included in the statement of rejection, since Dantzig and Karbuk are relied upon in the rejection without reference to the relevant column or page number(s) and line number(s), and since the Office Action acknowledges that Hedge does not disclose all of the claim limitations in the independent claims, the Applicants submit that a prima facie case for rejecting claims 1-21 under 35 U.S.C. §103(a) has not has not been established.

Finally, the Applicants submit that even if Hedge were not disqualified as a reference and even if the Dantzig and Karbuk articles were positively recited in the rejections with reference to the relevant column or page and line numbers, these references alone and/or in combination do not teach or disclose the following claim limitations of amended independent claim 1 (or the similar claim limitations of amended independent claims 8, 15 and 21): (1) "initially solving, by a computer system, said linear program with material balance and sourcing constraints to produce an initial solution, wherein, during said initially solving, selected ones of said material balance and sourcing constraints are relaxed, wherein said selected ones of said material balance and sourcing constraints are associated only with the least complex parts within bills of materials

used by said linear program, wherein said least complex parts comprise raw materials and unassembled parts, and wherein said initial solution identifies values for variables in said linear program"; and (2) "finally solving, by said computer system, said linear program using said values identified in said initial solution as said variables and with all of said material balance and sourcing constraints in place such that none of said material balance and sourcing constraints are relaxed in order to obtain a complete solution of said linear program".

It should be noted that in rejecting independent claim 1, the Office Action specifically addressed the decomposing limitation; however, this decomposing limitation is not included in independent claim 1.

In rejecting independent claim 1 (and similarly in rejecting independent claims 8, 15 and 21), the Office Action provided that Hedge discloses:

"determining which of said constraints can be temporarily relaxed based on stocking point criteria that relates to time dependent stocking points comprising part numbers, locations of parts identified by said part numbers, and the time periods when said parts will be available (Hegde [0100] teaches that inputs to the LP model are adjusted to relax the LP model. Hegde [0099] bases the relaxation on the Bill of Materials.); relaxing selected constraints of said linear program based on said determining process (Hegde [0100].); decomposing said linear program into smaller independent linear programs (Hegde [title] teaches a decomposition system and method where decomposition means creating a number of smaller independent linear programs.)".

In addition in rejecting independent claim 1 (and similarly in rejecting independent claims 8, 15 and 21), the Office Action acknowledges that Hegde does not specifically teach the following limitations: initially solving said smaller independent linear program with relaxed constraints to produce an initial solution; replacing variables in said linear program with constants based on said initial solution; restoring said material balance and sourcing constraints;

and finally solving the linear program using said constants and with all constraints in place to obtain a complete solution of said linear program.

Thus, the Examiner provides as follows:

"Examiner takes Official Notice that it is old and well-known as well as common place in the mathematical programming arts to incorporate the use of decomposition methods wherein constraints are initially relaxed, subproblems solved and constraints restored resulting in a solution using all constraints. Such methods such as first taught in Dantzig and Wolfe and also in Karabuk and Wu teach such techniques where the solution to a relaxed subproblem is used to provide a starting solution to the more complete problem wherein the decomposition is also modeled using stages as in dynamic programming stages wherein the solution of one stage serves as the controlling parameters for the succeeding stages."

The Applicants respectfully disagree with not only with findings in the Office Action with respect to Hedge, but also with the findings in the Office Action to the effect that Dantzig and Wolfe disclose all of the claim limitations not taught by Hedge.

Specifically, in the present invention provides a method and system for solving a linear program having constraints in a production planning system. The invention first determines which of the constraints can be temporarily relaxed based on stocking point criteria. The stocking point criteria relates to time dependent stocking points that include part numbers, locations of parts identified by the part numbers, and the time periods when the parts will be available. The invention relaxes the constraints that can be relaxed and then solves the linear program (i.e., performs an initial solving process). This initial solving process can involve decomposing the linear program into smaller independent linear programs and solving the smaller programs simultaneously in parallel to produce an initial solution, which includes values for variables in the linear program. Subsequently, the linear program is again solved (i.e.,

resolved). However, this time the linear program is solved using the values previously acquired during the initial solving process as constants in place of the variables and further with all of the constraints in place (such that none of the constraints are relaxed) in order to obtain a complete solution of the linear program.

Hedge discloses a method and system for allocation of limited manufacturing resources over time to meet customer demand. Per the Summary (see paragraph [0055]), in the Hedge method a bill of materials is separated by manufacturing stages and each manufacturing stage is partitioned in a heuristic processing and a linear programming processing partition. A MRP production plan is calculated for each manufacturing stage using either the heuristic processing or the linear programming processing by moving backwards through the stages with respect to the BOM. A best-can-do production plan is calculated using either the heuristic processing or the linear programming processing, depending on the partitioning step by moving forward through the sages with respect to the BOM. The MRP production solution information is prepared for passing recursively backward to a next manufacturing stage. Similarly, information is passed forward based on the best-can-do calculating step. The method embodiments also include imploding and exploding (from top to bottom) the BOM.

More particularly, referring to Figure 8 and the associated text, the method of Hedge includes a pre-processing step, an explosion step, an implosion step and a post-processing step. The pre-processing step includes separating a bill of materials into independent stages. In the explosion step an MRP-type explosion is carried out for each partition of each stage to determine certain requirements and prepare solution information to be passed backwards to the next stage. In the implosion step supply is matched to the requirements computed in the explosion step

subject to capacity constraints and information is passed forwards. Once a feasible production plan is generated, post-processing is carried out to create coherent output files and user-friendly reports.

Paragraphs [0099]-[0100] of Hedge (i.e., the cited portions of Hedge) discuss specifically, the explosion function at a given stage. Specifically, during explosion a heuristic MRP calculation is performed in the heuristic partition of the current stage in order to pass demand attribute information from the top to the bottom of the BOM for the stage. The demand attribute information is passed by mapping each demand against the assets which satisfy it and then passing this information through the BOMs explosions. This allows the demand attribute information of one manufacturing stage to be later passed to subsequent (lower level) stages. Next, liner programming is performed in the linear programming partition of the current stage again passing information from the top to the bottom of the BOM for the stage.

Paragraph [0100] does mention relaxing linear programming inputs. However, these relaxed inputs in the linear programming process of Hedge are not selected based on stocking point criteria, but rather based on the customer's demand date. Specifically, the only constraint disclosed as being relaxed during the linear programming process of Hedge is the customer demand date. If that demand date has already ready come and gone, it can be relaxed in order to allow the linear programming to behave as if activities can be done in the past (i.e., the linear programming can be run with a time horizon that beings in the past). Furthermore, such a customer demand date constraint is necessarily associated with all parts of the BOM and not just associated with the least complex parts (i.e., raw materials and unassembled parts) within the BOM, as claimed.

Thus, the Applicants acknowledge that Hedge discloses solving a linear program using some relaxed constraints, but not the same constraints as are relaxed in the present invention.

Furthermore, the Applicants submit that Hedge does not disclose solving the linear program a second time, as claimed. As mentioned above, the Office Action acknowledges that Hegde does not specifically disclose initially solving said smaller independent linear program with relaxed constraints to produce an initial solution; replacing variables in said linear program with constants based on said initial solution; restoring said material balance and sourcing constraints; and finally solving the linear program using said constants and with all constraints in place to obtain a complete solution of said linear program. Therefore, the "Examiner takes Official Notice that it is old and well-known as well as common place in the mathematical programming arts to incorporate the use of decomposition methods wherein constraints are initially relaxed, subproblems solved and constraints restored resulting in a solution using all constraints. Such methods such as first taught in Dantzig and Wolfe and also in Karabuk and Wu teach such techniques where the solution to a relaxed subproblem is used to provide a starting solution to the more complete problem wherein the decomposition is also modeled using stages as in dynamic programming stages wherein the solution of one stage serves as the controlling parameters for the succeeding stages." The Applicants respectfully disagree.

Per the Abstract, Dantzig simply discloses a technique for the decomposition of a linear program that permits the problem to be solved by alternate solutions of linear sub-programs representing its several parts and a coordinating program that is obtained from the parts by linear transformations. The coordinating program generates at each cycle new objective forms for each part, and each part generates in turn (from its optimal basic feasible solutions) new activities

(columns) for the interconnecting program. That is, Dantzig teaches decomposition of a linear program into sub-programs, solving the sub-programs and subsequent coordinating of the solved parts. It does not, however, disclose solving the sub-programs with relaxed constraints or again solving the linear program by "using said values identified in said initial solution as said variables and with all of said material balance and sourcing constraints in place such that none of said material balance and sourcing constraints are relaxed in order to obtain a complete solution of said linear program".

Per the Abstract, Karabuk is a study of capacity planning in the semiconductor industry. Specifically, Karabuk formulated a multi-stage stochastic program with demand and capacity uncertainties. To reconcile the marketing and manufacturing perspectives, Karabuk considered a decomposition of the planning problem resembling decentralized decision-making and developed recourse approximation schemes representing different decentralization schemes. So, while Karabuk mentions decomposition, it does not go beyond that to disclose solving the sub-programs with relaxed constraints or again solving a linear program by "using said values identified in said initial solution as said variables and with all of said material balance and sourcing constraints in place such that none of said material balance and sourcing constraints are relaxed in order to obtain a complete solution of said linear program".

Therefore, the Applicants submit that amended independent claims 1, 8, 15 and 21 are patentable over the cited prior art reference(s). Furthermore, dependent claims 2, 4-7, 9, 11-14, 16 and 18-20 are similarly patentable, not only by virtue of their dependency from a patentable independent claim, but also by virtue of the additional features of the invention they define. Moreover, the Applicants note that all claims are properly supported in the specification and

accompanying drawings, and no new matter is being added. In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw the rejections.

IV.   Formal Matters and Conclusion

With respect to the rejections to the claims, the claims have been amended, above, to overcome these rejections. In view of the foregoing, Applicants submit that claims 1-2, 4-9, 11-16 and 18-21, all the claims presently pending in the application, are patentably distinct from the prior art of record and are in condition for allowance. Therefore, the Examiner is respectfully requested to reconsider and withdraw the rejections to the claims and further to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary. Please charge any deficiencies and credit any overpayments to Attorney's Deposit Account Number 09-0456.

Respectfully submitted,

Dated: September 3, 2009   /Pamela M. Riley

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